

XV.—*Observations on the Ancient Fauna of the Mascarene Islands.* By M. ALPHONSE MILNE-EDWARDS*.

AMONG the bones collected in the Island of Mauritius, in the Mare aux Songes, side by side with the remains of the dodo and of the gigantic coot, which I have already had the honour of mentioning to the Academy, I noticed a lower jaw which appeared to me to be derived from a bird entirely unknown at the present day, and belonging to the group of the Grallæ, together with some parts of the foot indicating the former existence of a new generic type allied to *Ocydromus*. I inclined to believe that all these bones belonged to the same extinct species; but I hesitated about pronouncing an opinion upon this subject, when some facts of another kind lately ascertained at Vienna by M. von Frauenfeld removed all my doubts, and enabled me to arrive at more complete results.

In the collection of paintings upon vellum made chiefly in the reign of Rodolph II. by Hoefnagel, a Dutch artist, and which now belongs to the private library of the Emperor of Austria, that naturalist found two coloured drawings, reproductions of which he hastened to publish. One of these pictures represents the dodo, the other a very remarkable bird, which in its aspect somewhat resembles the *Apteryx*, and which appears to be the species mentioned by F. Cauche, under the name of the *Poule rouge au bec de Bécasse*, as living in the Island of Mauritius at the beginning of the seventeenth century. In the memoir which accompanies these plates, M. von Frauenfeld has endeavoured to settle the place which this bird should occupy in our zoological classification; but the characters displayed by the figure which he had before him could not enable him to arrive at a complete solution of this question, and he was obliged to confine himself to indicating the features of resemblance of the *Poule rouge au bec de Bécasse* on the one hand to the Gallinaceæ, on another to the Rails, and in the third place to the *Apteryx*; finally, he gives it the generic name of *Aphanapteryx*—a designation which seems to indicate that it is with the last that he found the greatest analogy.

I easily convinced myself that the bones of which I have just spoken as having been found in the Mauritius, and the examination of which had been kindly intrusted to me by MM. Newton, all belonged to the *Aphanapteryx*; and the anatomical peculiarities presented by these fossils enable me

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to establish with strict precision the natural affinities of this lost type, and to assign it its true zoological position.

The *Aphanapteryx* or *Poule rouge au bec de Bécasse* is not a gallinaceous bird, nor does it belong to the natural group of which the *Apteryx* is now the only living representative; it is not a Rail properly so called, but it must take its place side by side with the Australian genus *Ocydromus*.

The lower mandible, in its general form, resembles that of the curlews, ibises, and certain passerine birds, such as *Promerops*, *Xiphorhynchus*, *Falculia*, and *Dendrocolaptes*; but the osteological characters furnished by the arrangement of the articular surface, and by the form of what I have denominated the *postdentary* fissure, do not allow us to regard this bone as belonging to any passerine or gallinaceous bird, or to any of the genera of Grallæ which I have just mentioned; nor do its characters remove it less from *Apteryx*; and to find a more complete resemblance we must compare this beak with that of *Ocydromus*.

In order to avoid making this statement too long, I must suppress here all descriptive details, which will be found in the memoir which I deposit upon the bureau of the Academy. I shall confine myself to adding that if, from the structure of this part of the head, we seek to explain the habits and diet of the bird to which it belongs, we shall see that the absence, or at least the slight development, of the foramina and little channels for the passage of nerves and vessels will not allow us to ascribe to it the habits of the ibises, curlews, godwits, or snipes. This pointed beak of very dense tissue somewhat resembles that of *Porphyrio* and *Ocydromus*, and reminds us still more of the conformation of the mandibles in the oystercatchers; it seems to be perfectly adapted for breaking the shells and resisting envelopes of the animals on which the *Aphanapteryx* probably fed.

It is sufficient to glance at the metatarsus to be convinced that it is derived from a bird admirably constructed for walking; it is perfectly balanced, and, without being too massive, is very robust. Its characters indicate most clearly that it cannot be derived from a bird of prey or from a passerine or natatory bird. It has belonged to a walking bird, and in its general form as well as in several of its characters it approaches that of the Gallinaceæ; nevertheless it is impossible to refer it to that group. In fact I have ascertained that in all the Gallinaceæ, without exception, the flexor muscle belonging to the hind toe is inserted upon a deeply hollowed surface of the posterior face of the heel bounded by very prominent crests. In nearly all the birds of this group, even in those

which are destitute of spurs, there also exists a bony crest or stay which unites the postero-interior margin of the bone with the heel. These characters are entirely wanting in the fossil found in the Mare aux Songes. If we compare this metatarsus with that of the waders, we find that its relative proportions, as well as its anatomical peculiarities, separate it from that of the Ciconidæ, Gruidæ, Ardeidæ, Totanidæ, and Bustards; but we find in it great analogies with the foot-bone of certain representatives of the family Rallidæ, although it differs much from the typical form in this group. But it is to be remarked that in proportion as these birds are constructed for walking, their metatarsus acquires more and more the distinctive characters of that of *Aphanapteryx*: thus in passing successively from the Coots to the Rails, to *Tribonyx* and to *Ocydromus*, we insensibly arrive at the form which is presented by our fossil, and which, at the first glance, would appear to be quite special.

In the same deposit with this lower mandible and tarso-metatarsal several tibiæ have been discovered, which seem to be referable to the same bird; for the study of the peculiarities which they present leads to the same result as the examination that I have just made of the osteological characters of the foot-bone.

All these anatomical facts prove, it seems to me, that *Aphanapteryx* forms a peculiar generic division side by side with *Ocydromus*. It must be regarded as one of those transition forms which are so remarkable in the animal kingdom; it is a rail, the organization of which has adapted itself to an essentially terrestrial existence.

We see, from the figure the knowledge of which we owe to M. von Frauenfeld, that the feathers of this bird were too light and possessed too little resistance to have been capable of serving it for flight, and moreover the wings were rudimentary; the feet, on the contrary, presented considerable strength, but they are not very long, and the toes are less elongated than is usual in this family. This would lead us to think that this species had less aquatic habits than most of the Rallidæ; nevertheless the [hind] toe is very long, as in birds which frequent muddy places where the soil has but little consistency, whilst among the true runners it disappears more or less completely, in order to diminish the weight at the extremity of the arm of the lever formed by the foot.

The recent destruction of the *Aphanapteryx* can only be ascribed to man or to the animals which he brought in his train; and it is interesting to remark that this species, which inhabited the Mascarene Islands at a period so nearly ap-

proaching our own days, is a new example fitted to demonstrate, on the one hand, the existence of close relationships between the fauna of these isolated lands and the zoological population of the Australasian region, and, on the other, the complete separation of this fauna from that of the great African continent.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

June 18, 1868.—Lieut.-General Sabine, President, in the Chair.

“Note on the Bloodvessel-system of the Retina of the Hedgehog.”
By J. W. HULKE, F.R.S., Assistant-Surgeon to the Middlesex Hospital and the Royal London Ophthalmic Hospital.

The distribution of the retinal blood-vessels in this common British Insectivore is so remarkable that I deem it worthy of a separate notice: *only capillaries enter the retina.*

The vasa centralia pierce the optic nerve in the sclerotic canal, and, passing forwards through the lamina cribrosa, divide, at the bottom of a relatively large and deep pit in the centre of the intra-ocular disk of the nerve, into a variable number of primary branches, from three to six. These primary divisions quickly subdivide, furnishing many large arteries and veins, which, radiating on all sides from the nerve-entrance towards the ora retinæ, appear to the observer's unaided eye as strongly projecting ridges upon the inner surface of the retina. When vertical sections parallel to and across the direction of these ridges are examined with a quarter-inch objective, we immediately perceive that the arteries and veins lie, throughout their entire course, upon the inner surface of the membrana limitans interna retinæ, between this and the membrana hyaloidea of the vitreous humour, and that only capillaries penetrate the retina itself.

In sections of the retina across the larger vessels the membrana limitans may be seen as a clean distinctly unbroken line passing over the divided vessels, with which it does not appear to have any direct structural connexion. The relation of the hyaloidea to the large vessels seems to be more intimate; but its exact nature can be less certainly demonstrated, owing to the extreme tenuity of this membrane. In my best sections I saw the hyaloidea also crossing the large vessels, as does the limitans; but excessively delicate extensions of the hyaloidea appeared to me to lose themselves upon the vessels.

The capillaries, shortly after their origin, bend outwards away from the large vessels, and, piercing the retina vertically to its stratification in a direction more or less radial from the centre of the globe, and branching dichotomously in the granular and inner granule-layers, they form loops, the outermost of which reach the inter-granule layer. As they enter the retina, the membrana limitans